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## Using a geriatric oncology assessment to link with services (GOAL)

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### Abstract

**Objective:** Geriatric screening tools assess functional limitations and inform clinical decision-making for older adults with cancer. Our objective was to evaluate the feasibility and effectiveness of a screener in community-based oncology clinics.

**Materials and Methods:** Eligible patients were from two rural, underserved community-based cancer clinics; within 12 months of a cancer diagnosis (breast, lung, colorectal, pancreas, esophageal); aged ≥ 60 years; and not exclusively pursuing palliative care. We used a previously validated tool that was embedded in the electronic health record (EHR). Patient-reported responses identified memory impairment, depressive symptoms, deficits in activities of daily living, poor nutrition, and polypharmacy. At the discretion of the oncologist, responses prompted service referrals. From the EHR, we extracted information about referrals and completion of planned therapy. We present descriptive statistics.

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Manuscript editing: All authors.

Manuscript review: All authors.

#### Conflicts of Interest

The authors have no conflicts of interest relevant to the current work to report.

**Results:** Enrolled patients ( $n = 44$ ) had a mean age of 71.5 years ( $SD = 6.9$ ). Most were non-white (61%), women (66%), with government-sponsored health insurance (80%). The most commonly identified geriatric syndromes: polypharmacy (89%), reduced quality of life (39%), and poor nutrition (39%). The screener triggered a referral in 98% of patients. Generated referrals were for depressive symptoms (52% needed, 39% received), nutrition (43% needed, 37% received), and polypharmacy (89% needed, 26% received). Patients were referred to social work (56%), nutrition (44%), and pharmacy (25%). Many patients completed planned radiation therapy (100%), surgery (70%), and chemotherapy (60%).

**Conclusions:** Use of an EHR-embedded brief geriatric oncology assessment in rural oncology clinics identified geriatric syndromes that would benefit from provision of services in nearly all enrolled patients.

**Trial Registration:** [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT02906592) Identifier: NCT02906592.

## Keywords

Geriatric assessment; Community-based; Cancer; Older patients; Referral

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## 1. Introduction

Age is the single most impactful risk factor for cancer [1]. Based on the latest data, there are an estimated 15.5 million Americans living with cancer, and approximately 9.3 million were aged 65 years and older [2]. Increasing age is associated with complex changes in physiology and may result in geriatric syndromes including increased comorbid conditions and decreased functional status. Additionally, cancer and its treatment may reduce patients' physical reserve. However, chronological age alone is a poor predictor of adherence to treatment and of cancer treatment-related outcomes [3, 4]. Among older adults with cancer, physical function is associated with susceptibility to treatment-related toxicity; geriatric assessment screeners are important tools to detect frailty and potential geriatric syndromes [5–9]. Considering the presence of geriatric syndromes (i.e., multifactorial risk factors including cognitive and functional impairment) and associated issues (e.g., polypharmacy) is a more appropriate basis for clinical treatment decision making.

The International Society of Geriatric Oncology has endorsed the use of comprehensive geriatric assessments to identify potential functional status issues and other problems that are associated with cancer outcomes and has recommended their use in daily practice [10, 11]. While comprehensive geriatric assessments remain the gold standard [12], it may be impractical to use them in daily clinical practice because they are resource-intensive and time-consuming. In contrast, brief screening instruments may be more efficient to administer and can still provide actionable information. While a brief screening tool cannot collect information that would be as detailed as what would be available in a comprehensive geriatric assessment, brief screeners may be more practical to implement and offer utility in daily clinical practice. Despite a surge in the development and testing of geriatric screening tools for older patients with cancer [13], there is a gap in their implementation in routine clinical care [14]. In the U.S., the majority of patients with cancer receive care in community-based clinics [15] where uptake of geriatric screening tools may be particularly

delayed because of limited resources. Our objective was to pilot test the implementation of a brief geriatric assessment screening tool in two oncology practices located in low-resource, largely minority, underserved communities.

## 2. Materials and Methods

### 2.1.1. Brief Geriatric Screening Tool

We used a validated brief geriatric screening tool called the Senior Adult Oncology Program (SAOP) screener [16]. We chose the SAOP because it has been validated and provides actionable information (i.e., identifying geriatric syndromes and associated resource needs to address them). The SAOP screener is aimed at identifying older patients who would benefit from additional evaluation by a specialized team. Patients were asked approximately 16 items that are designed to identify memory impairment, depressive symptoms, deficits in activities of daily living and instrumental activities of daily living, poor nutrition, and polypharmacy (e.g., taking five or more medications daily). The screener was administered by clinic staff and responses were entered directly into the patient's electronic health record in the form of a templated visit note. The screener was most commonly administered by a clinic nurse during the collection of a patient's vital signs or by a patient's medical oncologist at the beginning of their visit.

Clinic staff were provided with a scoring sheet based on responses and a list of recommended referrals. The clinic staff member who administered the SAOP screener manually calculated scores for each domain (e.g., memory impairment, depressive symptoms, etc.) When a patient scored positive for a geriatric syndrome (e.g., triggered referral), the patient's oncologist was prompted to review the patient-reported screener responses. The prompt occurred when the patient's oncologist viewed the SAOP screener note in the Electronic Health record (EHR). A referral for services was created at the discretion of the oncologist (e.g., recommended referral). For example, a patient might score positively for having problems with preparing their own meals and feeding themselves, and a potential referral could be triggered for their oncologist to review. The oncologist could refer the patient for services (e.g., home health assessment) when they were uncertain whether a patient had adequate social support in their home environment. The brief geriatric screening tool was administered upon enrollment in the study.

### 2.1.2. Eligibility Criteria and Patient Recruitment

We recruited patients from two oncology clinics located in rural, southeastern North Carolina communities (Scotland Cancer Treatment Center in Laurinburg, North Carolina and The Gibson Cancer Center in Lumberton, North Carolina). We selected these facilities because they are "real world" clinics (e.g., not managed by a tertiary, academic medical center) in underserved areas. The clinics serve racially diverse (e.g., 35% African American, 10% American Indian), older, rural, low resource communities with over 20% of the population living in at or below the federal poverty level. Thus, we posited that strategies used in these settings could be broadly disseminated to a myriad of other clinical contexts.

To be eligible for the study, patients must have been identified at one of the study clinics within the first 12 months of their cancer diagnosis and receiving medical oncology care at the study sites. Patients must have been 60 years of age or older at the time of enrollment and diagnosed with one of a variety of solid tumors (e.g., breast, lung, colorectal, pancreas, esophageal). In an effort to exclude patients with limited life expectancy, patients were ineligible if they were exclusively pursuing palliative care (e.g., only receiving hospice or end of life care). This was determined based on a review of patients' electronic health record and confirmed by their medical oncologist.

A research team member identified patients meeting eligibility criteria who had upcoming clinic appointments. A list of potentially eligible patients was provided to medical oncologists who were given an opportunity to opt a patient out of the study for any reason; however, no oncologists indicated that their patient(s) were inappropriate candidates for the study. After providing informed consent, a clinic staff member administered the geriatric screening tool to patients as part of their clinic intake process.

### 2.1.3. Key Measure Data Collection

We extracted from the electronic health record patients' responses to the brief geriatric screening tool. We also collected information about triggered referrals and actual referrals placed by oncologists. To evaluate completion of therapy, we identified information about patients' planned course of therapy (e.g., surgery, radiation therapy, chemotherapy) and their adherence with the planned therapy.

### 2.1.4. Statistical Analysis and Ethical Approval

We report descriptive statistics as means and or as frequencies and percentages. SAS statistical software version 9.4 (SAS Institute Inc., Cary, NC) was used for the analysis. This study was approved by the Duke Institutional Review Board and was reviewed by the ethics committees at the two study clinics. This study is registered on [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT02906592) (identifier: [NCT02906592](https://clinicaltrials.gov/ct2/show/study/NCT02906592)).

## 3. Results

### 3.1. Sample Characteristics

We enrolled 44 patients and had a response rate of approximately 77% ( $n = 57$  approached,  $n = 44$  enrolled,  $n = 13$  refused; Table 1). Patients were diagnosed from February 2016 through July 2017. The mean age was 71.5 years (SD = 6.9). The sample was primarily of minority race – African American (36%) and American Indian (25%). Approximately half of the study sample were married (48%), women (66%), on government-sponsored health insurance (80%), with breast cancer (57%). The majority of patients were diagnosed with non-metastatic disease (82%) and received chemotherapy (80%).

### 3.2. Brief Geriatric Screener Responses and Triggered Referrals

The most commonly reported geriatric syndromes were: 1) problems with polypharmacy (89%), defined as taking five or more medications daily; 2) reductions in overall quality of health (43%) and quality of life (39%); and 3) nutritional issues (72%; Table 2). On

their first completion of the geriatric screener, the majority of patients (43 out of 44 patients, 98%) screened as potentially benefiting from at least one type of referral. When patients' oncologists reviewed their geriatric screener responses, 16 patients (37%) were officially referred to an ancillary service. For patients for whom a referral was not placed, a reason was documented the majority of the time, including "a family member or caregiver supplied support," "patient declined a referral", and "prior referral had been made". The screener detected possible depressive symptoms that could require a referral for 52% of patients; an oncologist placed a referral for 39% of patients who screened positive for depressive symptoms. The screener detected possible nutritional needs for 43% of patients; an oncologist placed a referral for 37% of patients who screened positive for nutritional needs. The screener detected possible challenges with polypharmacy for 89% of patients; an oncologist placed a referral for 26% of patients who screened positive for polypharmacy. As a result of the triggered referrals, patients were most commonly referred to social work (56%), nutrition (44%), pharmacy (25%), and mental health (20%; Table 3). On average, there were 3.5 referrals (SD 2.1) triggered for each patient that completed the geriatric screener.

It is worth noting that no patients were referred to geriatrics at either site because this service was unavailable. It is possible that patients were referred to their primary care provider. Because continued receipt of primary care was expected, this was not captured as part of our study.

### 3.3. Completion of Cancer Therapy

Patients were most commonly prescribed chemotherapy ( $n = 35$ ), with the majority (83%) being for curative intent. Patients also received radiation therapy ( $n = 25$ , 92% curative intent) and surgery ( $n = 23$ , 96% curative intent). Only one patient was being treated with surveillance only and this patient maintained scheduled clinic appointments and services. Treatment completion rates were high. All patients completed planned radiation therapy (100%). Many patients (70%) completed their planned surgery and 60% completed chemotherapy.

We evaluated whether adherence to planned therapy was better among patients who received referrals for ancillary services based on identified need. Among the 42 people who triggered a referral and had a treatment other than surveillance, 16 received referrals and 26 did not. Of the 16 who had the referral done, 9 (56.3%) completed treatment. Of the 26 who did not have the referral done, 15 (57.7%) completed treatment. The p-value on the chi-square test for an association between having a referral made and completing treatment is 0.93.

## 4. Discussion

Consistent with a small body of prior research [17], our study determined that it is possible to implement a brief geriatric screener in rural, low resource, community-based practices. Our study enrolled patients from two community-based clinics in rural, largely minority populations living in underserved communities. The majority of clinical trials and studies involving geriatric assessments [18] have been conducted in large, academic medical centers. Relatively few studies have engaged community-based sites [19]. The brief

geriatric screener was administered by clinic staff including nurses, midlevel providers, and oncologists. While we did not systematically collect information about the time required to complete the brief geriatric screener, clinic staff reported that the screener required approximately two to 3 min to complete in its entirety. Because the tool was brief and embedded in the electronic health record, clinic staff reported that the screener did not disrupt their clinic work flow. This suggests that it may be practical to use a brief geriatric assessment tool in busy, community-based cancer clinics. In this community-based setting, the brief geriatric screener was also practical from a patient perspective. Patients were willing to complete the screener and no one withdrew from the study. While the comprehensive geriatric assessment remains a gold standard, with a graying population and the growing prevalence of cancer diagnosis and survival among older adults [2], there is an increased need for screening tools that can be implemented in busy cancer clinics and ensure that patients received needed supportive care.

Our analysis had several limitations. While this was a pilot study, the sample size was small ( $n = 44$ ). We were interested in understanding what referrals were triggered by the geriatric screener responses; however, we were only able to see generated referrals and due to limitations of the electronic health record systems, we were unable to determine whether patients actually completed each recommended referral. In a future study, it would be important to collect patient-reported information about whether and which referrals were actually completed.

Despite these limitations, our analysis makes several important contributions to the literature. Our study enrolled patients with a myriad of solid tumor cancers, whereas many existing studies involved only women with breast cancer [20–22]. While women with breast cancer are an important group, there may be gender or treatment differences experienced by women with breast cancer that are unique from patients with other characteristics. By enrolling patients with a variety of cancers in community-based clinics and engaging existing clinic staff, our pilot study is positioned to better inform our understanding of what could practically be implemented in a “real world” clinic setting.

In our study, patients’ responses to the brief geriatric screener uncovered important geriatric syndromes. These included issues on a variety of domains and the information was typically actionable. It is worth noting that while many patients screened positive for potential geriatric syndromes in our study, oncologists often chose not to refer them for services. In our limited exploratory analysis, referral to a service did not seem to impact adherence to planned therapy. However, knowledge of common patient impairments is still useful to inform oncologists about common clinical issues among patients and might generate practice quality improvement. For example, having a more comprehensive process for medication reconciliation, hiring more mental health counselors, and/or having additional resources available to meet anticipated demand could result from adopting the screener we studied. Future work is needed to engage pharmacists and geriatricians along with cancer care teams, particularly important in rural communities where resources may be less available. Our next steps are to expand this work into other sites (e.g., both community-based and academically-affiliated clinics), other cancer types (e.g., hematologic cancers), in



the form of a robust, multi-arm study and be able to assess not only utilization of services, but also their impact on cancer-related outcomes.

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**Table 1**Sample characteristics ( $n = 44$ ).

	N(%)
Mean age in years (SD) at enrollment	71.5 (6.9)
Sex	
Male	15 (34.1%)
Female	29 (65.9%)
Race	
White	17 (38.6%)
Black	16 (36.4%)
American Indian	11 (25.0%)
Missing	0
Marital Status	
Married/living with partner	21 (47.7%)
Single/never married	4 (9.1%)
Divorced/separated	8 (18.2%)
Widowed	11 (25.0%)
Insurance Status	
Commercial	9 (20.5%)
Medicare/Medicaid/VA	35 (79.5%)
Uninsured	0
Cancer Type	
Breast	25 (56.8%)
Lung	7 (15.9%)
Colon	5 (11.4%)
Rectum	4 (9.1%)
Pancreas	2 (4.6%)
Esophagus	1 (2.3%)
Stage	
Metastatic	8 (18.2%)
Non-metastatic	36 (81.8%)
Planned Treatment	
Surgery	23 (52.3%)
Chemotherapy	35 (79.6%)
Radiation therapy	25 (56.8%)
Clinic site	
Laurinburg	31 (70.5%)
Lumberton	13 (29.6%)

**Table 2**Geriatric oncology screener responses ( $n = 44$ ).

	Complete Impairment	Some Impairment	No Impairment N (%)	Missing
Altered status				
Someone to help take care of you <sup>1</sup>	7 (15.9%)	NA	37 (84.1%)	0
Sad more days than not <sup>2</sup>	9 (20.5%)	NA	35 (79.6%)	0
Lost interest <sup>2</sup>	12 (27.3%)	NA	32 (72.7%)	0
Quality of life and self-rated health				
Present quality of life <sup>3</sup>	17 (38.6%)	NA	27 (61.4%)	0
Overall health <sup>3</sup>	19 (43.2%)	NA	25 (56.8%)	0
Hospitalizations in the past year <sup>4</sup>	4 (9.1%)	20 (45.5%)	19 (43.2%)	1 (2.3%)
Pay for prescription medications <sup>1</sup>	7 (15.9%)	NA	37 (84.1%)	0
Sleep well <sup>1</sup>	14 (31.8%)	NA	30 (68.2%)	0
Activities of daily living				
Dress yourself completely <sup>5</sup>	1 (2.3%)	3 (6.8%)	40 (90.1%)	0
Feed yourself <sup>5</sup>	0	0	44 (100%)	0
Use a cane, walker or wheelchair <sup>6</sup>	10 (22.7%)	3 (6.8%)	31 (70.5%)	0
Need help getting out of bed <sup>6</sup>	2 (4.6%)	3 (6.8%)	39 (88.6%)	0
Incontinent of urine <sup>6</sup>	2 (4.6%)	6 (13.6%)	36 (81.8%)	0
Need help taking a shower or bath <sup>6</sup>	4 (9.1%)	2 (4.6%)	38 (86.4%)	0
Tripped or fallen in the past year <sup>2</sup>	15 (34.1%)	NA	29 (65.9%)	0
Able to drive <sup>7</sup>	5 (11.4%)	NA	39 (88.6%)	0
Able to prepare your own meals <sup>5</sup>	2 (4.6%)	2 (4.6%)	40 (90.9%)	0
Able to go shopping <sup>5</sup>	2 (4.6%)	6 (13.6%)	36 (81.8%)	0
Take care of your finances <sup>5</sup>	3 (6.8%)	4 (9.1%)	37 (84.1%)	0
Use the telephone <sup>5</sup>	0	2 (4.6%)	42 (95.5%)	0
Remember to take your medications <sup>5</sup>	3 (6.8%)	3 (6.8%)	38 (86.4%)	0
Nutrition				
Lost 5 pounds or more without dieting <sup>2</sup>	17 (38.6%)	NA	27 (61.4%)	0
Appetite decreased <sup>2</sup>	9 (20.5%)	NA	35 (79.6%)	0
Changes in the types of food you are able to eat <sup>2</sup>	6 (13.6%)	NA	38 (86.4%)	0
Cognition <sup>8</sup>	16 (36.4%)	NA	28 (63.6%)	0
Medication				

	Complete Impairment	Some Impairment	No Impairment N (%)	Missing
How many medications, herbals, and vitamins are you taking <sup>9</sup>	39 (88.6%)	NA	5 (11.4%)	0

<sup>1</sup>No impairment indicated with a response of yes, complete impairment indicated with a response of no.

<sup>2</sup>No impairment indicated with a response of no, complete impairment indicated with a response of yes.

<sup>3</sup>A response of <8 on a 1–10 scale indicated complete impairment, a response of 8 or greater indicated no impairment.

<sup>4</sup>A response of none indicated no impairment, a response of 1 indicated some impairment, and a response of 2 or more indicated total impairment.

<sup>5</sup>A response of “yes” indicated no impairment, a response of “yes, but with help” indicated some impairment, and a response of “no” indicated total impairment.

<sup>6</sup>A response of “no” indicated no impairment, a response of “yes, occasionally” indicated some impairment, and a response of “yes” indicated total impairment.

<sup>7</sup>A response of “yes” indicated no impairment, a response of “have never driven” indicated some impairment, and a response of “no” indicated no impairment.

<sup>8</sup>A MMS screen value  $\geq 10$  indicated no impairment, a value <10 indicated complete impairment.

<sup>9</sup>Taking 3 or fewer medications was represented under no impairment, taking >3 was represented under complete impairment.

Table 3

## Results of Senior Adult Oncology Program (SAOP) Screener.

		Would benefit from referral	Documentation of referral place
		N (%) <sup>*</sup>	
Social support	If necessary, is there someone who could help take care of you?	12 (27.3%)	5 (41.7%)
	Are you always able to pay for your prescriptions?		
Depression	Do you feel sad more days than not?	23 (52.3%)	9 (39.1%)
	Have you lost interest in things you used to enjoy (hobbies, food, sex, being with friends/family)?		
	How would you rate your present quality of life?		
ADL independent	Can you dress yourself completely?	18 (40.9%)	10 (55.6%)
Dressing	Can you feed yourself?		
Feeding	Do you use a cane, walker, or wheelchair?		
Walking assist	Do you need help to get out of bed/chair?		
Getting out of bed/chair	Are you incontinent of urine?		
Toileting	Do you need help taking a shower or a bath?		
Bathing	Are you able to drive?	18 (40.9%)	7 (38.9%)
IADL independent	Are you able to prepare your own meals?		
Driving	Are you able to go shopping?		
Cooking	Can you take care of your finances?		
Shopping	Can you use the telephone?		
Finances	Do you remember to take your medications?		
Telephone	Have you tripped or fallen in the past year?	15 (34.1%)	7 (46.7%)
	Have you lost 5 pounds or more in the past 6 months without dieting?	19 (43.2%)	7 (36.8%)
Nutritional issues	Has your diet decreased in the last 3 months?		
	Has there been a change in the types of foods you are able to eat?		
Polypharmacy	How many medications/herbals/vitamins are you taking?	39 (88.6%)	10 (25.6%)
	Are you always able to pay for your prescription medicines?	7 (15.9%)	4 (57.1%)
Memory deficit	Memory deficit	16 (36.4%)	8 (50.0%)

<sup>\*</sup> n (%) with affirmative response.